

their knowledge of him at second hand, so that his discoveries and views are generally stated with more or less inaccuracy. This becomes clear on perusing the present work, a translation from the Latin of Mayow's five treatises, for which we are indebted to the Alembic Club.

The basis of Mayow's work was his recognition of the existence in the air and in common nitre of extremely subtle particles to which he gave the name "nitro-aërial spirit." He did not, however, as is often supposed, regard air as a mixture of two gases, as we do to-day, but considered the nitro-aërial particles to be "fixed in the aërial particles themselves," and to be "torn from them by the burning of a lamp or the breathing of animals." They are, in fact, "neither air itself nor some material interspersed among its particles." Whilst the generally received opinion is correct that Mayow recognised that an increase of weight occurs when metals are burnt in air, it is also true that he made but little use of this fundamentally important observation; in the main his experiments were purely qualitative, and ingenious as they often were, they served in many cases to distract the attention from the real issue. Had it been otherwise the course of chemical history might have been different.

When it is remembered that, in Mayow's time, fire and air, mercury, sulphur, and salt were regarded as the fundamental elements, the clearness and originality of his views is very striking. He substitutes his nitro-aërial spirit (which we now call oxygen) for air and fire, and considers that out of the conflict of this spirit with "sulphur" (that is, the combustible constituent of substances) "all the changes of things arise." At each step he feels his way by new experiments, as, for example, when he shows that a mouse, in breathing, diminishes the volume of air like a burning candle, or that, when put in a glass vessel along with a lamp, it will not breathe much longer than half the time it would otherwise have lived. His views on respiration are quite correct; by way of the lungs "the aërial particles enter the mass of the blood and are there deprived of their nitro-aërial particles." The latter are indeed "the principal instruments of life and motion." He scoffs at the idea of a vital flame as a source of animal heat, accounting for the latter by "the nitro-aërial particles in the blood fermenting with its saline-sulphureous particles" (or, as we should say, by the oxidation of combustible material).

It was probably unfortunate that Mayow sought to explain by the aid of his nitro-aërial spirit the most diverse phenomena, such as the elasticity of solids, the nature of light and colours, of lightning and the transmission of nerve impulses, for in so doing the more important facts established were obscured in a haze of speculation which Mayow's early death prevented him from dispelling; thus it happened that exactly a century had to elapse before the work of Scheele, Priestley, and Lavoisier led to a re-discovery of principles already clearly enunciated as early as 1674.

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#### TOWN GAS.

*Town Gas and its Uses for the Production of Light, Heat and Motive Power.* By W. H. Y. Webber. Pp. vii + 275. (London: A. Constable and Co., Ltd., 1907.) Price 6s. net.

THE opening lines to the preface of this book supply the keynote to all that follows—"This book is a summary of what I know, that appears to me to be likely to interest a generally well-informed but not technically instructed reader about the manufacture of town gas and its uses."

The author, who was for many years the subeditor of the chief organ of the gas industry, has brought to bear his wide knowledge and ripe experience of the subject, and has given us a book that will be welcomed by all consumers of gas who desire an insight into the mysteries of its manufacture, and the best way to consume it for either heat, light, or power. The term "town gas" is used in preference to coal gas in order to cover the admixture of carburetted water gas and coal gas now so often distributed as a town supply, and which was necessitated chiefly by the demand for high candle-power gas, whilst now that the incandescent mantle has rendered rich gas not only unnecessary but wasteful, it is to be sincerely hoped in the interests of the consumer that carburetted water gas will disappear, and that only unadulterated coal gas will again become the general supply.

Excellent as is the book as a whole, there are many points that invite criticism; it was to be expected that the author would be an ardent champion of the virtues of coal gas, but surely when (pp. 175, 176) he is comparing the relative cost of coal and gas as a fuel for domestic use, and debits the cost of coal with a servant's wages and keep at 4*l.* a month, so bringing the cost of the coal as a fuel to 5*l.* 15*s.* a ton, he is going too far, and is more likely to do his cause harm than good. Burnt in properly constructed gas stoves, so arranged that none of the products of combustion find their way into the air of the room, coal gas is an ideal fuel, and, taking into consideration the cleanliness, saving in labour, convenience, and the fact that it need only be used when wanted, it can be shown to be equal in cost at 2*s.* 6*d.* per 1000 cubic feet to coal at 24*s.* per ton, but beyond this its most ardent advocate would scarcely venture to go.

Again, in speaking of the smoke curse and its prevention, he says (p. 227), "Gas is the sole practicable cure for this crying evil"—a statement which would not be endorsed by the advocates of smokeless fuels, such as anthracite, coke, coalite, or its imitations.

Some small inaccuracies might with advantage be corrected in a future edition; for instance, no gas manager would be inclined to accept as an average example of the normal supply to "the British Metropolitan region" a gas containing 15.52 per cent. of carbon monoxide, 1.5 per cent. of carbon dioxide, and 5.31 per cent. of nitrogen (p. 5).

On p. 69 the author speaks of blue water gas being made by the "methane-hydrogen plant"; this form of apparatus, however, should be deleted from amongst the "blue" gas plants, as its value is dependent upon

its producing a gaseous mixture in which methane plays an important part.

The chapters upon gas lighting and the arrangement of light for indoor and outdoor illumination are excellent, whilst the chapter upon the legal relations of gas suppliers, consumers, and the public should prove of the greatest value to those who desire to gain an insight into the intricacies of gas legislature.

#### OUR BOOK SHELF.

*The Canterbury Puzzles and Other Curious Problems.*

By H. E. Dudeney. Pp. xxiii + 195. (London: W. Heinemann, 1907.) Price 3s. 6d.

THE author of this little book is a well-known expert in the invention and solution of puzzles. Those which he presents to the reader are in the main entirely original; those which are not so are given in a new dress. Puzzles can be made, as the author says, out of almost any materials, and most people are familiar with specimens made out of matches, cards, coins, &c. Generally speaking, they are in essence either of an arithmetical or geometrical character, and involve, consciously or unconsciously, mathematical processes. An inferior class it is difficult to deal with except by some tentative process which involves no clear line of reasoning; such, for instance, are certain dissection problems which are of the nature of "patience," and are not good exercises for the intellect. Mr. Dudeney may be congratulated on having excluded these from his book.

It is no easy matter to invent a good puzzle; the simplest method would be to modify or generalise a known one; a really new idea is not likely to come from anyone who has not considerable knowledge and power of observation. The author gives shortly the solutions of the puzzles without, in the large majority of cases, explaining them. He recognises that the non-scientific solver is generally satisfied with knowing the solution, and is not curious about reasons; at the same time, he has known how to whet the appetite of more intelligent and curious persons for a knowledge of the principles which underlie the solutions. As an example may be noted the puzzle called "Lady Isabel's Casket." The square top of a box was inlaid with a rectangular strip of gold 10 inches by  $\frac{1}{4}$  inch, and for the rest with square pieces of wood, no two of which were of the same size. The puzzle is to find out the size of the top of the box from these data. In his solution of this difficult question, Mr. Dudeney gives you the pattern, and states that the number, size, and order of the squares can be calculated direct from the given dimensions of the strip of gold, and that there is only one possible solution. He then leaves the mathematical reader with an interesting if difficult nut to crack.

The book is written in a popular manner, and is copiously illustrated so as to impart as much human interest as possible into the various questions. The puzzles are of great variety, and will be found interesting and alluring to persons of all kinds.

*Matter and Intellect: A Reconciliation of Science and the Bible.* By Andrew Allan. Pp. vi + 224. (London: A. Owen and Co., n.d.) Price 5s.

THIS book has value from one point of view only; it is a series of unscientific statements of the very first water. "Now if we suppose that the oceans of the earth are represented by the bright sides of the discs of the radiometer, and the continents by the dark sides, we can understand how the sun attracts the water and repels the land, thus causing the earth

to rotate upon its axis." Even Mr. Allan's more specific attempts to "reconcile Science and the Bible" will provide the average reader with amusement more often than they will scandalise him. "The serpent which tempted Eve was probably a dinosaurian, and may possibly have been the *Iguanodon*, a reptile which 'must have walked temporarily or permanently upon its hind legs,' thus presenting a human appearance, to which its magnificent skin or robe of feathers would add considerable beauty. Eve, therefore, seeing this human-like animal eating of the tree, and suffering no harm, would readily forget the prohibition, and be tempted to try the fruit for herself without any actual speech passing between the two."

Only one serious comment suggests itself when one's capacity for laughter is exhausted. This extraordinary work comes from a writer who has ability enough often to express himself clearly and forcibly, and quotes constantly from the pages of our more august popularisers of science. The schoolmaster admits at least a partial responsibility for the examination blunder. Is the blame here to be thrown entirely upon the pupil?

*Leçons sur la Viscosité des Liquides et des Gaz.* By Marcel Brillouin. Part i., Généralités. Viscosité des Liquides. Pp. vii + 228. Part ii., Viscosité des Gaz. Caractères généraux des Théories moléculaires. Pp. 141. (Paris: Gauthier-Villars, 1907.) Price 9 francs and 5 francs.

BOTH the mathematical and experimental study of viscosity are admittedly of a high order of difficulty, and the author is to be congratulated on the clear and concise manner in which he has developed his subject. After summarising in the first chapter the early work on viscosity, the mathematical treatment of the subject is fully developed in the following four chapters. The second part of the first volume is devoted to a description of experimental work. Each of the principal memoirs is described and subjected to a careful criticism; this part of the book is very complete, and is absolutely free from the tendency to ignore work done outside France occasionally met with in French standard works.

In the second part the theoretical and experimental study are taken together, the relations between the viscosity and the dynamical theory of gases being fully discussed. The concluding chapters contain a general discussion of the molecular theories of liquids and gases.

The work as a whole is characterised by clear exposition, acuteness and fairness of criticism, and completeness. It will doubtless take its place as the standard work on viscosity.

*Aphorisms and Reflections.* From the works of T. H. Huxley; selected by Henrietta A. Huxley. Pp. vii + 200. (London: Macmillan and Co., Ltd., 1907.) Price 2s. 6d. net.

To quote one of these aphorisms, "Time, whose tooth gnaws away everything else, is powerless against truth." There is garnered in Huxley's works so much truth worth wide dissemination that we echo heartily Mrs. Huxley's wish that this book will attract the attention of many persons who are yet unacquainted with her husband's writings. We trust also that this attractive volume, which can be carried in the pocket, will serve to make men of science and students turn oftener to the complete works of this master of lucid expression, who proved conclusively by his essays that it is possible to describe scientific achievements in a manner which will appeal to earnest readers of all classes.